

REMARKS

Claims 1 to 18 are currently pending in the present application. Claims 2, 7, 8, 10, 11, 15, 17 and 18 are amended herein. Claim 16 is cancelled. Claims 19 and 20 are newly added. No new matter is added by the amendments or the new claims.

Claims 2, 7, 8, 10 and 11 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to point out and distinctly claim the subject matter which applicant regards as his invention. In particular, a broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation is considered indefinite. Claims 2, 7, 8, 10 and 11 have been amended to claim the broader ranges cited. Applicants submit that claims 2, 7, 8, 10 and 11 are now definite and properly comply with 35 U.S.C. § 112, second paragraph. Reconsideration and withdrawal of the rejections of claims 2, 7, 8, 10 and 11 under 35 U.S.C. § 112, second paragraph, is respectfully requested.

Claims 1, 3 to 9 and 11 to 18 stand rejected by the Action under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,282,263 to Arndt et al. (hereinafter "Arndt"). Claim 16 is cancelled, accordingly the rejection of claim 16 is moot. Applicants respectfully submit that Arndt does not expressly or inherently disclose all of the elements set forth in independent claims 1, 14 and 15. Thus, Arndt does not anticipate claims 1, 14 and 15 or claims 3 to 9, 11 to 13, or 17 to 18, which depend therefrom.

It is an object of the present invention to provide an X-ray source and a target for use in such an X-ray source which allows the generation of substantially monochromatic X-rays, by which a significant dose reduction can be achieved and which permits a higher power loadability compared to known X-ray sources. The present invention thus provides for a discrete line X-ray source based on electron impact of a thin metal foil carried by a base arrangement. The invention of claim 1 discriminates against the

bremsstrahlung radiation by observing the radiation emitted on the side of the target on which the electrons are incident, i.e. the radiation which is essentially antiparallel to the initial electron beam direction. The power loadability of the proposed X-ray source is thus much greater than that of known stationary anode X-ray sources. Accordingly, claim 1 claims an X-ray source comprising: an electron source for the emission of electrons, a target for the emission of characteristic, substantially monochromatic X-rays in response to the incidence of the electrons, said target comprising a metal foil of a thickness of less than 10 μ m and a base arrangement for carrying said metal foil, wherein the metal of said metal foil has a high atomic number allowing the generation of X-rays and the material substantially included in the base arrangement has a low atomic number not allowing the generation of X-rays, and an outcoupling means for outcoupling the X-rays on the side of the metal foil on which the electrons are incident and which is opposite to the side of the base arrangement.

Arndt does not disclose a means for achieving significant dose reduction and higher power loadability compared to known X-ray sources. Rather, Arndt is directed to an X-ray generator which produces an X-ray source having a focal spot or line of very small dimensions. Accordingly, Arndt discloses an X-ray generator suitable to be closely coupled to a focusing X-ray device. Arndt fails to disclose an X-ray source and a target for use in such an X-ray source which allows the generation of substantially monochromatic X-rays, by which a significant dose reduction can be achieved and which permits a higher power loadability compared to known X-ray sources. Specifically, Arndt fails to disclose a target for the emission of characteristic, substantially monochromatic X-rays in response to the incidence of the electrons. The Action cites Arndt at column 6, lines 15 to 18 for disclosing a target for the emission of characteristic, substantially monochromatic X-rays in response to the incidence of the electrons. However, the only relevant information disclosed at this location is a micron thickness for a copper layer. Arndt is silent regarding characteristic, substantially monochromatic X-rays. Accordingly, for at least this reason, independent claim 1 is patentable over Arndt.

Independent claims 14 and 15 also claim a target for the emission of characteristic, substantially monochromatic X-rays in response to the incidence of the electrons. Accordingly, claims 14 and 15 are patentable over Arndt for at least the reasons discussed with respect to claim 1.

Dependent claims 3 to 9, 11 to 13, or 17 to 18 depend from claims 1 and 15 and provide further features, thus claims 3 to 9, 11 to 13, or 17 to 18 are clearly distinguishable over Arndt for at least the reasons discussed with respect to claims 1 and 15. Accordingly, the applicants respect that the rejections under 35 U.S.C. § 102(b) of claims 1, 3 to 9 and 11 to 18 should be withdrawn and claims 1 and claims 1, 3 to 9 and 11 to 15, 17 and 18 should be allowed.

Claim 15 stands rejected by the Action under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,078,644 to Day et al. (hereinafter “Day”). Applicants respectfully submit that Day does not expressly or inherently disclose all of the elements set forth in independent claim 15. Thus, Day does not anticipate claim 15.

Claim 15 has been amended to claim an X-ray source comprising: an electron source for the emission of electrons, and a target for the emission of substantially monochromatic X-rays in response to the incidence of the electrons, said target comprising a metal foil of a base arrangement, said metal foil allowing the generation of X-rays and the base member not allowing the generation of X-rays, wherein said base arrangement comprises a cooling circuit to allow a coolant to flow along the side of said metal foil opposite to the side on which the electrons are incident. Day, directed to a carbon-backed x-ray tube target such as a rotary metal-graphite composite target and more particularly to an x-ray target with a graphite substrate coated with a layer of chemically inert refractory metal, fails to disclose a target for the emission of substantially monochromatic X-rays. Day also fails to disclose a cooling circuit, let alone a cooling circuit to allow a coolant to flow along the side of said metal foil opposite to the

side on which the electrons are incident, as is now claimed by claim 15. Thus, claim 15 is not anticipated by Day. Accordingly, the applicants respect that the rejections under 35 U.S.C. § 102(b) of claim 15 should be withdrawn and claim 15 should be allowed.

Claims 1 to 3, 6 and 10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over of U.S. Patent No. 4,622,687 to Whitaker et al. (hereinafter “Whitaker”) in view of Arndt. Applicants respectfully submit that Whitaker and Arndt, when combined as suggested by the Action, fail to disclose all elements of independent claim 1.

Arndt fails to disclose the invention of claim 1 for the reasons discussed above. Whitaker, similar to Arndt, fails to disclose a target for the emission of characteristic, substantially monochromatic X-rays in response to the incidence of the electrons. Whitaker is directed to liquid cooled anode x-ray tubes, and in particular, x-ray tubes having a continuously cooled anode whereby high average power is achieved while still maintaining the high peak powers characteristic of rotating anodes. Whitaker does not disclose a means for the generation of substantially monochromatic X-rays, by which a significant dose reduction can be achieved and which permits higher power loadability. Thus, the cited combination fails to remedy the deficiency of Arndt stated above. The cited combination therefore fails to render obvious independent claim 1 or claims 2, 3, 6 and 10, which depend therefrom. Applicants therefore request that the rejections under 35 U.S.C. § 103(a) of claims 1, 2, 3, 6 and 10 be withdrawn.

Conclusion

In view of the foregoing, Applicants respectfully submit that the specification, the drawings and all claims presented in this application are currently in condition for allowance. Accordingly, Applicants respectfully request favorable consideration and that this application be passed to allowance.

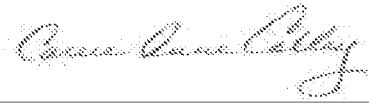
Appl. No. 10/538,525
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Should any changes to the claims and/or specification be deemed necessary to place the application in condition for allowance, the Examiner is respectfully requested to contact the undersigned to discuss the same.

Applicants' representative believes that this response is being filed in a timely manner. In the event that any extension and/or fee is required for the entry of this amendment the Commissioner is hereby authorized to charge said fee to Deposit Account No. 14-1270. An early and favorable action on the merits is earnestly solicited.

If the Examiner should have any questions concerning this communication or feels that an interview would be helpful, the Examiner is requested to call David Barnes, Esq., Intellectual Property Counsel, Philips North America Corporation at the number below.

Respectfully submitted,

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